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This 1966 Summer Institute for training educational research workers in statistical methodology attempted to convey concepts of statistical and analytic techniques, to provide instruction and experience in the use of high speed computers, and to guide trainees in the selection and application of techniques to their research work. The first session (June 6-July 15) was attended by 31 researchers actively engaged in secondary school education; 22 remained through the second session (July 19-August 12). During each session trainees attended morning classes in statistical techniques; afternoon classes were in behavioral research methodology (first session only) and computer laboratory work with an IBM 7094 and several IBM 1401 computers. A Problems Seminar was added in the second session. Trainees and faculty members, who were professional statisticians as well as subject matter specialists from social, behavioral, and computer science departments, offered suggestions for program improvement through an evaluation form. (Summary data on publicity, applications, trainees, program director's attendance, and finances are included.) (LP)

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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FINAL REPORT

Grant No. OEG-4-6-061932-1048

"Statistical Methodology for Educational Research"

November 4, 1966

U.S. DEPARTMENT OF

HEALTH, EDUCATION, AND WELFARE

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"Statistical Methodology for Educational Research"

Grant No. OEG-4-6-061932-1048

Dr. H. O. Hartley
Program Director

Instructional Dates of Program
June 6, 1966 - August 12, 1966

The training program reported herein was conducted pursuant to a grant from the Office of Education, U.S. Department of Health, Education, and Welfare. Grantees undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment of the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Texas A&M University

College Station, Texas

Final Report
For An Educational Research Training Project
(Summer Institute on "Statistical Methodology for Educational Research")

ORIENTATION

The purpose of this Institute was to train educational research workers in basic analytical techniques, notably statistical analysis, required in their research areas. Specifically, the Summer Institute extended over ten weeks and had the following objectives:

a) to convey an understanding of the basic concepts of statistical and analytic techniques to research workers in the educational field who had no prior exposure to these notions.

b) to extend the knowledge of statistical methodology of research workers who had been exposed to basic course work in this area.

c) to provide some instruction and experience in the use of high-speed computers for statistical analysis.

d) to provide guidance with regard to the selection and application of the statistical techniques appropriate to research problems of persons who were already working on specific research problems in the educational field.

The Course of Study

The Institute consisted of two sessions, Session I, 6 weeks, Session II, 4 weeks, and it was the intention that most persons should attend this Institute for the entire ten weeks.

Session I: Introduction to Basic Analytical Techniques
June 6 - July 15 (Coinciding with the first summer session at Texas A&M)

The morning sessions covered topics normally given in a basic statistical methods course. The text was Statistical Inference, Vol. I by J.C.R. Li (Edwards Brothers, Inc., Ann Arbor, Michigan, 1964). This book covers basic statistical analysis topics on a non-mathematical plane.

A brief list of the statistical techniques covered is as follows:

Descriptive Statistics

The Normal Distribution

Sampling Experiments

Sample Mean

Test of Hypothesis

Sample Variance χ^2 Distribution

Student's t-Distribution

Variance-Ratio - F Distribution

Difference Between Sample Means

Confidence Intervals

Randomized Blocks

In the afternoons, staff members of the Departments of Education and Psychology and Computer Science introduced Institute participants to topics in behavioral research methodology, including the discussion of examples in educational research of concepts taught in the morning sessions.

Session II: Additional Topics and Applications Seminar
July 19 - August 12, 1966

Morning lectures dealt with additional topics such as multiple regression, experimental design, and the analysis of general linear models. The text was Statistical Inference, Vol. II, by J.C.R. Li, (Edwards Brothers, Inc., Ann Arbor, Michigan, 1966).

A brief description of the statistical techniques covered is as follows:

Extensions of Analysis of Variance

Tests of Specific Hypotheses in the Analysis of Variance

Linear Regression-I

Multiple Regression-Algebra

Multiple Regression-Inference

Fitting Constants

Factorial Experiments

The afternoon sessions were devoted to computer laboratories (both conventional and high-speed) illustrating problems from the morning lectures, and in addition, there was conducted a "Problems Seminar" where the attendees of the Institute were invited to submit

their own research problems so that aspects of statistical analyses involved in these projects would be discussed.

Thirty-one trainees attended the first session only (June 6 to July 15) and twenty-two trainees attended both sessions (June 6 to August 12). All trainees were persons actively engaged in secondary school education and concerned with varying research aspects in their educational activities. They were either high school teachers or persons concerned with the administration of high school education at state offices or educational offices at a more local level. All trainees were highly motivated and some of them were intending to proceed to higher degree work in Education at a University. The age range of the trainees was considerable, ranging from 22 to 50 years of age.

DESCRIPTION OF THE PROGRAM

The time schedule followed by both sessions was as follows:

8:30 to 9:30	Lecture
9:30 to 9:45	Question Period
9:45 to 10:00	Intermission
10:00 to 11:00	Lecture
1:45 to 2:45*	Computer Laboratory
2:45 to 3:00	Intermission
3:00 to 5:00*	Session I: Lecture with Intermission Session II: Problems Seminar

*On Wednesday afternoons high speed computer laboratory - lectures.

The faculty for this Institute was comprised of professional statisticians from the Graduate Institute of Statistics, who provided faculty with acknowledged competence and established record of research in statistical methodology, and subject matter specialists from the social, behavioral, and computer science departments, who provided a faculty of similar standing with respect to the use of analytic techniques in their fields.

It was found that Dr. Gene Dayhoff, who was a scheduled faculty member in our proposal, received at short notice, an assignment in Brazil. It was, therefore, necessary to assign his duties in the Summer Institute to Mr. J. G. Darroch, Assistant Professor, Graduate Institute of Statistics. Moreover, it was also necessary to make a change in the instructor responsible for the Wednesday afternoon

high speed computer sessions: Mr. G. H. Dipple, Instructor in the School of Business Administration, took over the duties of Professor Don Drew. Mr. Dipple has acted, since the Fall of 1965, as the coordinator for Data Processing activities in the School of Business Administration.

The Faculty members for the various lectures and sessions were therefore as follows:

Morning Lectures

First Session
J. G. Darroch (Assistant Professor, Graduate Institute of Statistics)

Second Session
R. J. Freund (Associate Professor, Graduate Institute of Statistics)

Afternoon Lectures with Problems Seminar

First Session
D. G. Barker (Associate Professor, Department of Education and Psychology)
W. A. Luker (Head, Department of Business Analysis and Research)
G. H. Dipple (Instructor, School of Business Administration)

Second Session
H. O. Hartley (Director, Graduate Institute of Statistics)
W. A. Luker (Head, Department of Business Analysis and Research)

Facilities

Each student who attended the Summer Institute was allocated a working desk in an air-conditioned room for the duration of his attendance. The classes were conducted in modern air-conditioned classrooms equipped with visual aids. The use of Cushing Library (the main University library) and all branch libraries were made available for the use of the students. In addition, the extensive reprint collection of the faculty members of the Graduate Institute of Statistics was available to students who attended the advanced 'Problems Seminar.' The facilities of the well-known Texas A&M University Data Processing Center, which contains an IBM 7094 and several IBM 1401 computers, were available for the use of the participants.

EVALUATION OF THE PROGRAM

At the conclusion of both Session I and Session II, the attached instruments were given to every trainee in order to obtain guidance with regard to the success of the program. The trainees were asked to answer the questions but were told not to sign the instrument. It was hoped, thereby, to obtain frank and useful guidelines for an evaluation. Copies of the completed questionnaires are on file and could be made available to the Department of Health, Education and Welfare if requested.

An evaluation by our faculty of the instrument indicated that on the whole the program was regarded as both most useful and instructive; however, the following lessons can be learned with regard to future Summer Institutes.

There was an indication of "tiring" towards the end of the first session, but by the end of the second session the trainees staying for the full program did not indicate that the length of the full 10 weeks session was excessive. It is hoped that an anticipation of the second sessions activities in the first session will avoid this stagnating effect towards the end of the first session.

It is indicated that there should be a better coordination between the statistically oriented lectures and those on research methods and educational techniques.

It is indicated that some of the trainees were not able to derive sufficient benefit from a discussion of educational problems not directly linked with those that they themselves had encountered. It is suggested, therefore, that an assessment of the interests of the trainees be undertaken at a very early stage of the Institute so that the faculty can be better guided with regard to the selection of problems more likely to motivate the group of trainees as a whole. The trainees were very appreciative of the opportunity of discussing their own educational problems, both with the faculty as well as with their fellow trainees in the problem sessions.

The second session problem class must be regarded as perhaps the most successful part of the program: Trainees participated in the presentation of their problems, were guided to the selection of the appropriate statistical technique and applied these in sample computations. Seven problems were selected for discussion with an average duration of 2-3 afternoons per problem. The trainees submitting the problems returned to their home-base with plans for detailed statistical analysis.

The instruction of the application of high speed computers to educational problems was well appreciated. However, it was suggested that there be more of this activity and that the trainees efforts in this area should be recognized as part of the official assessment of their performance in the Institute's program.

The afternoon computer laboratory was very much appreciated by the trainees as it appeared to give them an opportunity of discussing the problems they encountered in class with the graduate student instructors in this laboratory. It appeared that the help rendered by these instructors was not merely confined to computational aspects, but also aided greatly with regard to the understanding of the subject matter areas presented in the lectures.

The facilities provided were regarded as a rule as entirely satisfactory, however, some indication was given that the number of calculators provided was not entirely adequate.

Some budgetary difficulties were encountered through the fact that (a) the trainees were not supposed to be charged tuition fees by the University and (b) no tuition fees should appear in the budget submitted to the Department of Health, Education and Welfare. It will, therefore, be necessary in future Summer Institutes to arrange with the University administration that the payment of tuition fees be reflected as an administrative item.

Selection Criteria

Participants in this Institute were to have consisted of persons who were at the time active in some phase of Education research. This included administrators and faculty members of Colleges and Universities having departments of Education; administrators, counselors and teachers in public education systems in which some research in Education was being carried on and research workers in government-agencies and private industry catering to educational needs. Participants were to possess at least a master's degree or equivalent and were to have a good knowledge of college algebra.

As mentioned above, in spite of the above criteria some of the trainees did not have an adequate quantitative preparation. This seems to have been a function of outdated training in college algebra. It is hoped that such shortcomings can be avoided in future selections provided that a grant for the Summer Institute is awarded early enough to permit our faculty a more searching application of the selection criteria.

PROGRAM REPORTS

Summary data and information reports as indicated below, are requested.

1. Publicity--The directors of the Institute employed the following techniques in publicizing the program: informational brochures, letters, and personal professional contacts.

   The brochures were mailed to state departments of education and education agencies in all fifty states, senior colleges and universities with departments or colleges of education, and selected public schools with research facilities and interests. Letters were mailed to selected mailing lists, e.g., the Texas Association of Data Processors. Personal telephone contacts were also made.

   The approximate dates of mailing, types of mailings, volume of mailings, and addressees are outlined below:

Date*	Type of Mail	Volume of Mail	Addressees
May 7	Info. Brochures	Approx. 1,000	State Dept. of Education
May 9	Pers. Letters	200	Selected Colleges & Universities
			Selected Public Schools
			Professional Contacts
			Professional Organizations

*These mailings were made immediately after official notice of funding which was given only 1½ months before the Institute was scheduled to begin. This delay allowed less than one month between the mailing of the announcement brochures and the date of acceptance of trainees. It is the considered opinion of the directors of the Institute that it was unfortunate that the funding agency could not act on the application sooner. This was largely responsible for the relatively poor geographic and professional distribution of the participants.

2. Application Summary

a. Approximate number of inquiries from prospective trainees (letter or conversation)	70
b. Number of completed applications received	40
c. Number of first rank applications (Applicants who are well-qualified whether or not they were offered admission)	7
d. How many applicants were offered admission	36

3. Trainee Summary

a. Number of trainees initially accepted in program	36
Number of trainees enrolled at the beginning of program	31
Number of trainees who completed program*	31
b. Categorization of trainees	
(1) Number of trainees who principally are elementary or secondary public school teachers	13
(2) Number of trainees who are principally local public school administrators or supervisors	9
(3) Number of trainees from State education groups	1
(4) Number of trainees from colleges or universities, junior colleges, research bureaus, etc. (specify)	7 (college) 1 (Jr. college)

4. Program Director's Attendance

a. What was the number of instructional days for the program?	50
b. What was the percent of days the director was present?	50%

*All trainees completed the six weeks program. The second four weeks were optional. All 22 who began the second four weeks completed the program.

5. Financial Summary

	Budgeted	Expended or Committed
a. Trainee Support		
(1) Stipends	26,250	20,600
(2) Dependency Allowance	8,625	8,160
(3) Travel	6,490	576
b. Direct Costs		
(1) Personnel	13,989	11,414
(2) Supplies	-0-	-0-
(3) Equipment	3,650	200
(4) Travel	252	-0-
(5) Other	559	100
c. Indirect Costs	4,785	2,500
TOTAL	64,600	43,550

Appendix A
Application for Admission

TEXAS A&M UNIVERSITY
INSTITUTE IN STATISTICAL METHODOLOGY
COLLEGE STATION, TEXAS

Application for Admission

Please type or print all information on this and/or other forms.

1. Name in full: Dr. / Mr. / Mrs / Miss ..... Last ..... First ..... Middle

2. CURRENT address: .....

3. PERMANENT residence address: .....

4. Citizen of: .....

5. Age ..... Date of Birth ..... Place of Birth .....

6. Marital status: ☐ Single ☐ Married ☐ No. of dependent children

7. By June will you have completed the equivalent of one or more normal years of full-time graduate study?
   ☐ Yes ☐ No

   By June will you have reasonable assurance of completing the requirements for a doctoral degree in one more year of graduate study?
   ☐ Yes ☐ No

8. Colleges or universities attended, including the one in which you are currently enrolled. Arrange in REVERSE sequence, listing your current (or last-attended) institution first:

Colleges or universities attended including present institution and states in which located.	Inclusive dates of attendance	Degree earned	Date awarded or expected	Major field

(Please explain any interruption of schooling, i.e., military training, illness, etc. on attached sheet if more space is needed.)

9. Academic honors:.....

.....

.....

.....

10. List any researches previously pursued, giving the title and reference to any published works. List the titles and any references possible for unpublished works. Do not send any reprints or other publications. (Use extra sheet of paper if needed.)

.....

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.....

11. Fellowships, scholarships, teaching, & other relevant positions held since entering college or university. (Use extra sheet of paper, if needed.)

Position	Place	Date

12. ~~Grade~~ Point Ratio Information based on A = 3, B = 2, C = 1, D = 0, F = 0:

All Undergraduate work:.....All Graduate Work:.....

Undergraduate Major:.....

13. What foreign languages can you read?.....

speak?.....

14. Do you plan to attend both sessions of the Institute? ☐ Yes ☐ No

15. Do you plan to participate in the Institute for college credit? ☐ Yes ☐ No

16. Names & addresses of three persons, each of whom knows your academic & professional experience and ability, whom you are requesting to submit Reference Reports. At least two of the three should be persons with whom you have worked in your major field. The others listed should be in closely allied fields.

.....

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.....

.....

17. In this space make a statement of about 300 words describing the objectives of your educational program and professional career.

18. **In this space make a statement of about 300 words describing the current research in which you are engaged.**

Signature of Applicant,.....Date.....

RETURN TO William A. Luker
Department of Business Analysis
Texas A&M University
College Station, Texas

Appendix B
Evaluation Forms

EVALUATION FORM

FOR

HEW SUMMER INSTITUTE IN STATISTICAL METHODOLOGY

FORM I

_____

Name of Instructor Being Rated

1. PREPARATION FOR CLASS MEETINGS

10 9 8	7 6 5 4	3 2 1 0
Class meetings carefully planned and conducted.	Usually some preparation; sometimes seems inadequate.	Little or no preparation, wanders.

2. KNOWLEDGE OF SUBJECT

10 9 8	7 6 5 4	3 2 1 0
Knowledge of subject broad, accurate, up-to-date.	Knowledge of subject somewhat limited and at times not up-to-date.	Knowledge of subject seriously deficient and frequently inaccurate and out-of-date.

3. ABILITY TO AROUSE INTEREST

10 9 8	7 6 5 4	3 2 1 0
Interest among students usually runs high.	Students seem only mildly interested.	Majority of students inattentive most of the time.

4. STIMULATE CRITICAL AND INDEPENDENT THINKING

10 9 8	7 6 5 4	3 2 1 0
Gives student opportunity to think and learn independently, critically, and creatively.	Gives student some opportunity to develop his academic resources on his own initiative.	Little or no attention to student ideas; ignores or discourages original and independent effort.

5. MANNERISMS

10 9 8	7 6 5 4	3 2 1 0
Manner pleasing; free from annoying manner-isms.	Mannerisms not seriously objectionable.	Constantly exhibits annoying mannerisms.

6. FAIRNESS IN GRADING

10 9 8	7 6 5 4	3 2 1 0
Fair and impartial; grades based on several evidences of achievement.	Partial at times; grades based on a few evidences of achievement.	Frequently shows partiality; grades based on very limited evidences of achievement.

7. WILLINGNESS TO HELP

10	9	8	7	6	5	4	3	2	1	0
Instructor exceptionally friendly; usually willing to help students even if busy.				Instructor moderately friendly; usually willing to help students.						Instructor aloof or sarcastic and preoccupied; unwilling to help students.

8. SPEECH AND ENUNCIATION

10	9	8	7	6	5	4	3	2	1	0
Speaks clearly and distinctly.				Worlds sometimes indistinct and hard to hear.						Words very indistinct; often impossible to hear.

9. EXAMINATIONS

10	9	8	7	6	5	4	3	2	1	0
Fairly reflect material covered.				Sometimes do not reflect emphasis given in class.						Poor; seems to be trying to "trick" the student rather than test him.

10. GENERAL ESTIMATE OF TEACHER

10	9	8	7	6	5	4	3	2	1	0
Very superior teacher.				Average teacher.						Very poor teacher.

11. GENERAL ESTIMATE OF THE EXPERIENCE

10	9	8	7	6	5	4	3	2	1	0
One of the most interesting, informative, useful, personally helpful courses.				About average in interest, usefulness, etc.						Totally useless and a waste of time.

12. DIFFICULTY OF EXPERIENCE

10	9	8	7	6	5	4	3	2	1	0
About right in terms of what was required of me.				Unnecesarily difficult.						Too easy: taught without any real substance or challenge.

EVALUATION FORM

FOR

NEW SUMMER INSTITUTE IN STATISTICAL METHODOLOGY

FORM II

1. GENERAL EVALUATION OF THE INSTITUTE

Enter any remarks here that you think may be constructive and helpful. Structure your remarks so that evaluations are made for each activity of the Institute, e.g., statistics lecture, statistics laboratory, research seminar, data processing seminar.

2. GENERAL EVALUATION OF INSTITUTE FACILITIES

Enter any remarks here that you think may be constructive and helpful. Structure your remarks so that evaluations are made for each facility of the Institute, e.g., classrooms, work areas, machines, University recreational facilities, and administrative procedures and personnel.